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EXTERNAL USES

OF THE

HYDRATE OF CHLORAL.

BY

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## THE EXTERNAL USES OF HYDRATE OF CHLORAL.

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CHLORAL was discovered by Liebreich in 1832, and in 1869 he found that chloral could be decomposed by caustic potash into chloroform and the formiate of potassium. This fact led him to believe that, if given internally, it would be decomposed by the alkalies of the blood, and free chloroform liberated. He imagined that chloral would thus act as a hypnotic and sedative. As the result of this *a priori* reasoning, Liebreich gave chloral internally, and found that it acted as a powerful hypnotic. Whatever difference of opinion may exist regarding the *modus operandi* of the hydrate of chloral, certain it is that it acts speedily and effectually as a sedative and hypnotic. And, consequently, the British Medical Council have wisely included it among the medicines lately added to the British Pharmacopœia. It was only, however, on account of its uses for internal purposes that it was made an officinal medicine. About the same time that chloral was added to the British Pharmacopœia, Dr Keen, Lecturer on Anatomy in the Philadelphia School of Medicine, made some interesting experiments with this substance, and clearly proved that, in addition to its hypnotic effects, chloral was a powerful antiseptic, and, as such, might be used for a variety of purposes. Dr Keen found that a watery solution of the hydrate of chloral formed an excellent antiseptic fluid with which to inject bodies for the dissecting-rooms, and was a good preservative fluid for anatomical specimens. He also tried it as a dressing to wounds, and found it answered exceedingly well.

These remarkable effects ascribed to this substance were sufficiently interesting to warrant me making a series of experiments and observations to ascertain the correctness of Dr Keen's views. I accordingly made, during the past year, a considerable number of experiments with the hydrate of chloral, and I have now the honour of communicating the results to this Society.

### *I. Solution of Chloral as a Preservative Fluid for injecting Bodies for the Dissecting-room.*

During the session 1874-75, through the kindness of Professor Turner, several bodies were injected with solutions of the hydrate

of chloral, and afterwards placed in the dissecting-rooms of the University of Edinburgh. The injections were made by Mr Stirling, Assistant-Keeper of the Anatomical Museum, and the bodies were carefully watched during the whole time that they remained in the dissecting-rooms by Drs Russell and Cunningham, Demonstrators of Anatomy. About 90 grains of the hydrate of chloral, dissolved in water, were injected into each body. The results observed were much the same in all the bodies. The subjects injected with chloral were as well preserved from putrefaction as were those injected with the ordinary preserving fluids, and when the parts were protected from the air, the colour of the parts was remarkably well preserved. This was specially true of the skin. The muscles were decidedly softer than usual, but the nerves were more easily dissected out. In bodies injected with chloral, the delicate plexuses of nerves could be more easily and more successfully dissected out than when injected with other preservative fluids, partly owing to the fact that the muscles and other tissues were softer, and consequently the nerves could be more easily dissected out. There are in the Anatomical Museum of the Edinburgh University some pretty dissections of delicate nerve-plexuses, made by Dr Cunningham in the University dissecting-rooms during the last winter session from bodies injected with the hydrate of chloral. When the bodies injected with chloral were carelessly exposed to the air, they became much darker in colour. Bodies injected with chloral gave off a peculiar mawkish odour, which was rather disagreeable to the students. Several students, at my suggestion, used a watery solution of chloral (5 grains to the ounce) as a preservative fluid for their "parts," and told me that it answered remarkably well. From these experiments the following conclusions may be drawn:—

1. Bodies injected with the hydrate of chloral are preserved from decay equally well as when the ordinary preservative fluids are used.

2. If exposed to the air, or carelessly attended to by the students, the tissues become very black, and give off a disagreeable mawkish odour.

3. Delicate nerve-plexuses can be more successfully dissected out when the bodies are injected with chloral solution; and,

4. It is much cheaper than other preservative fluids.

## II. *Solution of Chloral as a Preservative Fluid for Anatomical Specimens.*

The hydrate of chloral dissolved in water forms an excellent fluid in which to preserve animal tissues. In this respect its virtues as an antiseptic are well marked. I have the honour of showing to the members of this Society several specimens of animal tissues preserved in solutions of the hydrate of chloral, of the strength of 5 grains of chloral to the ounce of water; and in

many cases they seem to be preserved better than when put up in spirit. Amongst other preparations—

1. I show a wen which I removed from the head of a patient in August 1874, and which is preserved in an ounce of water containing 5 grains of the hydrate of chloral dissolved in it. The specimen is well preserved.

2. I show also a small foetus, which you will perceive is beautifully preserved. It has been kept for four months.

3. I next show the heart, lungs, liver, kidneys, and other parts of the abdominal viscera of a rabbit, preserved in the same fluid. These were put up in December 1874.

4. I also show three minnows, preserved in a chloral solution. They have now been fully nine months in the bottle, and you will see that they are much better preserved than would have been the case had they been put up in spirit.

I may also mention, that in the Anatomical Museum of the University of this city there are some beautiful preparations put up in chloral solution by Mr Stirling, and which he will be happy to show to any member of this Society who may wish to see them.

He has three salmon parr, preserved in a solution of chloral (15 grains to the ounce of water); these have been in the jar for four months, and nothing can exceed the beauty of these specimens. They are well preserved, and the colour of the skin is still perfect.

Mr Stirling has also preserved in chloral solution the stomach of a foetal calf. This is an interesting preparation, inasmuch as the stomach is still filled with its own original fluid, and has some of the foetal membranes attached. The whole are well preserved. They were put up in March 1875. He has also the injected heart of the same foetus. This was put up at the same time. At first the fluid appeared to act on the colouring matter of the injection, but this was only to a very limited extent, as the preparation is in an excellent state of preservation.

Solutions of the hydrate of chloral do not coagulate the albumen of the tissues, and, consequently, delicate transparent membranes are better preserved by chloral than by spirit or carbolic acid. There can be no doubt but, as a preservative fluid for anatomical specimens, it is superior to spirit, if not to every known antiseptic. It is much cheaper than methylated spirit, and is destitute of the disagreeable odour of that fluid.

### III. *Chloral as a Dressing for Wounds and Ulcers.*

I have tried chloral extensively as an external application to wounds and abraded surfaces. I found as the result of these experiments that a lotion containing from 5 to 15 grains of the hydrate of chloral to the ounce of water formed an excellent dressing to ulcers and wounds, dressed with lint and gutta-percha in the ordinary manner. I could relate several cases, but I will select only one. A young lad, T. M., lately one of the boys in the Mars train-

ing-ship, had one of his legs severely burned, and after being treated by the surgeon in charge of the ship for three months, the boy was recommended to go into Dundee hospital to have the limb amputated below the knee. As T. M. was within a fortnight of receiving his discharge from the ship, he was allowed to visit his friends in Edinburgh, who were unwilling that the leg should be amputated, and put the boy under my care. I saw him in April last, and found a large ulcer on the leg, extending from a little below the knee to the middle of the foot, and several inches in breadth. The edges were very irregular, and a considerable amount of fœtid discharge came from the ulcer. The boy and his friends were very anxious that I would try and preserve the limb. I ordered a lotion containing 15 grains of the hydrate of chloral to the ounce of water, some chloral lint, such as is manufactured by J. F. Macfarlan and Co. of this city, as recommended by Dr P. H. Watson, and some gutta-percha, and gave instructions for having the limb dressed twice daily with these. I may mention that previously it had been dressed with some preparation of carbolic acid. After the chloral dressing the limb healed rapidly. The ulcer got gradually less, the fœtid discharge disappeared; and when I saw the patient in July last, only a small ulcer remained, and even that was gradually diminishing in size, notwithstanding the fact that the boy was daily employed in a large drapery shop in town, and was unable to give the leg that rest which was necessary, and which I had so much recommended. The boy is now a sailor, and is at present on a voyage to Athens. I also used chloral solution as an injection into the sacs of large abscesses, and found that it tended much to diminish secretion and make the parts heal. I found it also a useful lotion for the eye in inflammatory conditions of that organ. It is an excellent application to burns, and very specially where there is a fœtid discharge. I also found it a good application to remove warts from the hands and fingers. I used for this purpose a lotion containing 15 to 20 grains to the ounce of water, applied by means of lint and gutta-percha. It causes no pain, and the wart speedily becomes smaller, and gradually disappears.

I also used it as a lotion to sore nipples and to inflamed mucous membranes. When chloral is applied to an ulcer, a wound, or to the interior of an abscess sac, it causes at first some smarting, but that only lasts for a few minutes, and is soon succeeded by a most agreeable sensation. Patients so treated have frequently told me that soon after the lotion was applied a very agreeable soothing effect was felt in the wound. I believe that in all such cases chloral acts as a local sedative. It produces anæsthesia of the nerves of the part. Wherever there is a wound or ulcer there is irritability of the nerves of that part; and chloral, by soothing this irritability of the nerves, favours the healing process.

I have frequently used with good effect an ointment containing 30 to 60 grains of the hydrate of chloral to the ounce in eczema

and other allied affections. I believe it to be one of the best applications in such diseases; and a medical practitioner lately told me that he had used it with marked benefit as a local application during an attack of erysipelas of the head. Chloral in various forms has been extensively used in the Royal Infirmary of this city by Dr P. H. Watson, senior surgeon to that institution, and I have the honour of appending a letter from him giving an account of his experience of hydrate of chloral as a dressing to wounds:—

“I have in my wards made use of the chloral hydrate for fully six months, and find it quite as active as an antiseptic as carbolic acid or boracic acid. It approaches nearer to carbolic acid in its effects than to the boracic acid, especially in that it is volatile, and thus by its vapour penetrates and surrounds parts to which as a dressing it has been applied with an atmosphere of itself.

“It has a marked advantage over carbolic acid, in so far that its odour is pleasant, resembling some of the ethereal compounds employed for flavouring purposes. It also is absorbed, and, in being so, deadens pain after an operation.

“I employ it in *four* forms:—

“1. A lotion of 5 to 40 per cent. in water, for cleansing away discharges around a wound, cleansing sponges used in operations, and analogous purposes.

“2. An ointment composed of concrete paraffin, white wax (Scotch), and almond-oil, to which 1-12th to 1-8th of chloral is added, while the other ingredients are liquefied by heat. The components of the ointment should at once be rubbed together, covered, to prevent the evaporation of the chloral, and cooled to a concrete form as rapidly as may be. It is afterwards rubbed up with a few drops of the solution of chloral to disintegrate it, and prevent its crystalline form being reassumed. This ointment takes great pains to make efficiently. If not properly prepared, it is either inert, containing sometimes, I find, absolutely no chloral; at other times (if made cold) the chloral is so imperfectly mingled that it acts as an irritant, and blisters tender cutaneous surfaces. The ointment is applied spread into the substance of linen cloth, so as to be incorporated with the material. This dressing forms the immediate application to the surface around the wound, and covers in the wound itself. It does not adhere, but peels off like a thin layer of wax.

“3. An external excipient dressing is made by soaking lint in a solution of chloral (ʒi. ad ʒj.). It is then wrung out of this and carefully dried. The care is necessary to avoid long exposure or a high temperature, as this volatilizes the chloral.

“4. Lint soaked in a solution of chloral in olive-oil (1-8), employed to fill cavities such as those left in some excisions, and to employ as compresses when it is desired to prevent bleeding from the cut surfaces in operations for the removal of *dead* bone.

“In some cases, when the chloral appears to act as an irritant, even when carefully prepared, it may be necessary to interpose some impermeable material between the line of operation and the dressing.

“I have never met with any disagreeable results from the absorption of the chloral. On the contrary, I have found the pain of recent wounds only satisfactorily modified and relieved by its employment.”



